Space Weather Forecast

Issued on Thursday, 19 October 2023 at 01:16 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Weak Coronal Mass Ejection arrivals possible, with a slight chance of isolated G1/Minor Geomagnetic Storm intervals throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Low, with the only notable flare being a common class flare from a region beyond the northwest limb at 18/0213 UTC. There five sunspot regions, all of which are relatively small and simple, and either stable or in decline. Two coronal mass ejections (CMEs) of note were observed in imagery. The one to the northwest has been assessed as far-sided. The less bright CME to the southeast was associated with an eruption from the southeast disc. This has been assessed as likely missing, passing behind and south of Earth, but with a slight chance of glancing impact either late day 3 or early day 4 (21-22 Oct)

Solar Wind / Geomagnetic Activity: A weak enhancement occurred due to the onset of the faster winds from a coronal hole, with a lower confidence potential that this included some element of either, or both, weak CME's from 14 Oct. The solar wind speed gradually rose from background, below 300km/s, before spiking upwards at 18/0844UTC to over 350km/s, then rising erratically to peak slightly elevated at 480km/s by 18/1445 UTC. Winds then gradually eased to near 400km/s. Interplanetary magnetic field (IMF) was predominantly weak but erratically increased with a period of more moderate values 18/1000-1400 UTC. The north-south component, followed a similar pattern, but initially positive (northward), before becoming predominately negative (southward) from 18/1000 UTC, with spells of moderate strength. Geomagnetic activity was Quiet to Unsettled (Kp 0-3).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) remained at background, with no solar radiation storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Low to Very Low activity expected. There is a slight, but perhaps increasing chance of isolated Moderate flares through the period with any development that occurs on the disc.

Solar Wind / Geomagnetic Activity: There are three CMEs with potential Earth impacts, however all are low confidence. The most likely arrival would be late day 1 or early day 2 (19-20 Oct) from the CME originating with the common class flare on 16 Oct. Further glancing impacts are possible, although less likely late day 2 or day 3 (20-21 Oct) from an eruption on 17 Oct, and then again day 3-4 (21-22 Oct) due to the CME from the eruption on 18 Oct. Otherwise current coronal hole sourced fast winds are expected to soon ease, but with a potential weak enhancement possible from further coronal hole sourced fast winds day 2 (20 Oct) onward, however this is also very low confidence. Overall, mainly Quiet geomagnetic activity is expected with Unsettled intervals. There is a chance for spells of Unsettled to Active with any of the CME arrivals, with a slight chance of G1/Minor Storm intervals.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is forecast to persist at background, with no solar radiation storms occurring.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	15	5	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	10	10	20	30
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	1	1	1	1
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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